

Europäisches Patentamt
European Patent Office
Office européen des brevets



(11) **EP 0 956 904 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
17.11.1999 Bulletin 1999/46

(51) Int. Cl.⁶: **B05B 1/02**, B05B 11/04,
B65D 47/18

(21) Application number: **99108628.1**

(22) Date of filing: **11.05.1999**

(84) Designated Contracting States:
**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
MC NL PT SE**
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: **14.05.1998 IT MO980023**

(71) Applicant: **LAMEPLAST S.R.L.**
41030 Rovereto di Novi (Modena) (IT)

(72) Inventors:
• **Fabbri, Evro**
41030 Rovereto di Novi (Prov. of Modena) (IT)
• **Ferrari, Giovanni**
41012 Carpi (Prov. of Modena) (IT)
• **Fontana, Antonio**
41012 Carpi (Prov. of Modena) (IT)

(74) Representative:
Modiano, Guido, Dr.-Ing. et al
Modiano & Associati SpA
Via Meravigli, 16
20123 Milano (IT)

(54) **Nozzle for dispensing liquids in drop form**

(57) A nozzle for dispensing liquids in drop form, comprising means (2) for hermetic coupling on the mouth of a bottle made of deformable material and an elongated dispensing duct (3) having a liquid inlet end (4) which has a diameter smaller than the diameter of said duct.

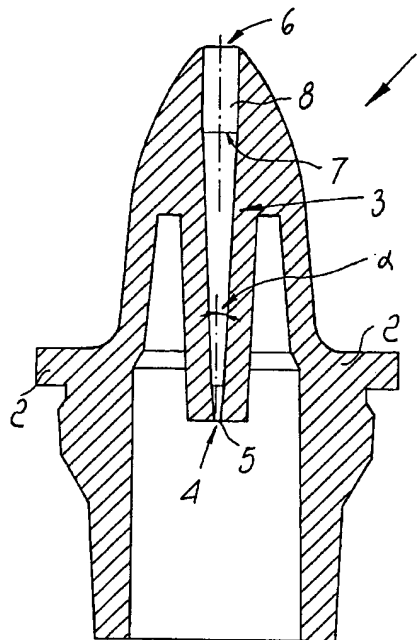


Fig. 1

EP 0 956 904 A1

Description

[0001] The present invention relates to a nozzle for dispensing liquids in drop form.

[0002] Bottles for liquids, such as medicines and the like, are conventionally made of a deformable material and have a mouth which is coupled hermetically to a nozzle which allows the liquid contained to flow out in the form of drops which have various weights and dimensions according to the outlet diameter of the nozzle.

[0003] These nozzles are not free from drawbacks, including the fact that they do not ensure effective control over the dimensions of the dispensed drop of liquid and do not allow the user to check the amount of liquid actually dispensed for each application, because said amount depends on the pressure applied to the deformable bottle.

[0004] Failure to control the outflow of the dispensed liquid also causes inevitable waste, with additional costs for the production of said liquid.

[0005] The aim of the present invention is to eliminate the above drawbacks of conventional nozzles by providing a nozzle for dispensing liquids in drop form which allows to perfectly control the dimensions of the drop of liquid being dispensed, to provide dispensing strictly in drop form regardless of the intensity of the pressure applied to the deformable bottle, to ensure effective control over the amount of liquid dispensed for each application, and to significantly reduce waste thereof.

[0006] Within the scope of this aim, an object of the present invention is to provide a nozzle for dispensing liquids in drop form having a structure which is simple, relatively easy to provide in practice, safe in use, effective in operation, and of relatively low cost.

[0007] This aim, this object and others which will become apparent hereinafter are achieved by the present nozzle for dispensing liquids in drop form, characterized in that it comprises means for hermetic coupling on the mouth of a bottle made of deformable material and an elongated dispensing duct having a liquid inlet end which has a diameter smaller than the diameter of the duct.

[0008] Further characteristics and advantages of the present invention will become apparent from the following detailed description of a preferred but not exclusive embodiment of a nozzle for dispensing liquids in drop form, according to the invention, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

Figure 1 is a sectional view of a nozzle for dispensing liquids in drop form according to the invention;
Figure 2 is a sectional view of a second embodiment of the last portion of the duct of the nozzle according to the invention;
Figure 3 is a sectional front view of a third embodiment of the last portion of the duct of the nozzle

according to the invention;

Figure 4 is a sectional front view of a fourth embodiment of the last portion of the duct of the nozzle according to the invention.

[0009] With particular reference to the above Figures, the reference numeral 1 generally designates a nozzle for dispensing liquids in drop form according to the invention.

[0010] The nozzle 1 is substantially ogive-shaped and has means 2 for hermetic coupling on the mouth of a bottle made of deformable material, not shown, and an elongated dispensing duct 3 whose liquid inlet end 4 has a very small diameter 5.

[0011] The duct 3 is coaxial to the nozzle 1, has a diameter which diverges toward the liquid outlet end 6, i.e. toward the end where the drop forms, and continues at the diameter 7 with a final portion 8.

[0012] The diameter 5 of the inlet end 4 is preferably between 0.1 and 0.3 millimeters, while the diverging diameter of the duct 3 forms an angle α which is between 0 and 30° and allows to form drops whose dimensions increase according to the breadth of said angle.

[0013] In Figures 1 and 3, the duct 3 has a last portion 8 with a constant diameter which is equal to, and greater, respectively, than diameter 7.

[0014] As an alternative, in the embodiments shown in Figures 2 and 4, the portion 8 of the duct 3 has a diameter which diverges toward the outlet end; moreover, in the example of Figure 4 the divergence of the portion 8 is greater than the divergence of the duct 3.

[0015] Once the diameter 5 has been set, different weights are obtained for the drop that forms according to the diameter 7, to the angle α and to the portion 8, which in turn determine the length of the duct 3.

[0016] For example, if the diameter 5 is equal to 0.2 millimeters, the diameter 7 is equal to 1.2 millimeters and the angle is equal to 2° 30', a drop weighing 0.030 milliliters forms.

[0017] Advantageously, there may be a different embodiment of the nozzle 1 in which the duct 3 has a constant diameter instead of diverging toward the outlet, as shown in the Figures.

[0018] It has thus been found that the invention achieves the intended aim and object, i.e. it allows to perfectly control the dimensions of the drop of liquid being dispensed according to the diameters of the inlet end and outlet end of the nozzle and according to the divergence angle.

[0019] The invention thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the inventive concept.

[0020] All the details may further be replaced with other technically equivalent ones.

[0021] In practice, the materials used, as well as the shapes and the dimensions, may be any according to requirements without thereby abandoning the scope of

Description

[0001] The present invention relates to a nozzle for dispensing liquids in drop form.

[0002] Bottles for liquids, such as medicines and the like, are conventionally made of a deformable material and have a mouth which is coupled hermetically to a nozzle which allows the liquid contained to flow out in the form of drops which have various weights and dimensions according to the outlet diameter of the nozzle.

[0003] These nozzles are not free from drawbacks, including the fact that they do not ensure effective control over the dimensions of the dispensed drop of liquid and do not allow the user to check the amount of liquid actually dispensed for each application, because said amount depends on the pressure applied to the deformable bottle.

[0004] Failure to control the outflow of the dispensed liquid also causes inevitable waste, with additional costs for the production of said liquid.

[0005] The aim of the present invention is to eliminate the above drawbacks of conventional nozzles by providing a nozzle for dispensing liquids in drop form which allows to perfectly control the dimensions of the drop of liquid being dispensed, to provide dispensing strictly in drop form regardless of the intensity of the pressure applied to the deformable bottle, to ensure effective control over the amount of liquid dispensed for each application, and to significantly reduce waste thereof.

[0006] Within the scope of this aim, an object of the present invention is to provide a nozzle for dispensing liquids in drop form having a structure which is simple, relatively easy to provide in practice, safe in use, effective in operation, and of relatively low cost.

[0007] This aim, this object and others which will become apparent hereinafter are achieved by the present nozzle for dispensing liquids in drop form, characterized in that it comprises means for hermetic coupling on the mouth of a bottle made of deformable material and an elongated dispensing duct having a liquid inlet end which has a diameter smaller than the diameter of the duct.

[0008] Further characteristics and advantages of the present invention will become apparent from the following detailed description of a preferred but not exclusive embodiment of a nozzle for dispensing liquids in drop form, according to the invention, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

Figure 1 is a sectional view of a nozzle for dispensing liquids in drop form according to the invention;
Figure 2 is a sectional view of a second embodiment of the last portion of the duct of the nozzle according to the invention;
Figure 3 is a sectional front view of a third embodiment of the last portion of the duct of the nozzle

according to the invention;

Figure 4 is a sectional front view of a fourth embodiment of the last portion of the duct of the nozzle according to the invention.

[0009] With particular reference to the above Figures, the reference numeral 1 generally designates a nozzle for dispensing liquids in drop form according to the invention.

[0010] The nozzle 1 is substantially ogive-shaped and has means 2 for hermetic coupling on the mouth of a bottle made of deformable material, not shown, and an elongated dispensing duct 3 whose liquid inlet end 4 has a very small diameter 5.

[0011] The duct 3 is coaxial to the nozzle 1, has a diameter which diverges toward the liquid outlet end 6, i.e. toward the end where the drop forms, and continues at the diameter 7 with a final portion 8.

[0012] The diameter 5 of the inlet end 4 is preferably between 0.1 and 0.3 millimeters, while the diverging diameter of the duct 3 forms an angle α which is between 0 and 30° and allows to form drops whose dimensions increase according to the breadth of said angle.

[0013] In Figures 1 and 3, the duct 3 has a last portion 8 with a constant diameter which is equal to, and greater, respectively, than diameter 7.

[0014] As an alternative, in the embodiments shown in Figures 2 and 4, the portion 8 of the duct 3 has a diameter which diverges toward the outlet end; moreover, in the example of Figure 4 the divergence of the portion 8 is greater than the divergence of the duct 3.

[0015] Once the diameter 5 has been set, different weights are obtained for the drop that forms according to the diameter 7, to the angle α and to the portion 8, which in turn determine the length of the duct 3.

[0016] For example, if the diameter 5 is equal to 0.2 millimeters, the diameter 7 is equal to 1.2 millimeters and the angle is equal to 2° 30', a drop weighing 0.030 milliliters forms.

[0017] Advantageously, there may be a different embodiment of the nozzle 1 in which the duct 3 has a constant diameter instead of diverging toward the outlet, as shown in the Figures.

[0018] It has thus been found that the invention achieves the intended aim and object, i.e. it allows to perfectly control the dimensions of the drop of liquid being dispensed according to the diameters of the inlet end and outlet end of the nozzle and according to the divergence angle.

[0019] The invention thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the inventive concept.

[0020] All the details may further be replaced with other technically equivalent ones.

[0021] In practice, the materials used, as well as the shapes and the dimensions, may be any according to requirements without thereby abandoning the scope of

the protection of the appended claims.

[0022] The disclosures in Italian Utility Model No. MO98U000023 from which this application claims priority are incorporated herein by reference.

[0023] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. A nozzle for dispensing liquids in drop form, characterized in that it comprises means for hermetic coupling on the mouth of a bottle made of deformable material and an elongated dispensing duct having a liquid inlet which has a diameter smaller than the diameter of said duct.
2. The nozzle according to claim 1, characterized in that said duct has a constant diameter.
3. The nozzle according to claim 1, characterized in that said duct has a diameter which diverges toward an outlet or drop formation end.
4. The nozzle according to claim 3, characterized in that a terminal portion of the outlet end of said duct has a constant diameter.
5. The nozzle according to claim 3, characterized in that a terminal portion of the outlet end of said duct has a diameter which diverges toward the outlet end.
6. The nozzle according to claim 5, characterized in that said portion diverges more than said duct.
7. The nozzle according to claim 1, characterized in that the diameter of said inlet end is between 0.1 and 0.3 millimeters.
8. The nozzle according to claim 3, characterized in that said diverging diameter forms an angle between 0 and 30° in order to form drops of increasing size.
9. The nozzle according to claim 1, characterized in that said duct is axial.
10. The nozzle according to claim 1, characterized in that it is ogive-shaped.

55

the protection of the appended claims.

[0022] The disclosures in Italian Utility Model No. MO98U000023 from which this application claims priority are incorporated herein by reference.

[0023] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. A nozzle for dispensing liquids in drop form, characterized in that it comprises means for hermetic coupling on the mouth of a bottle made of deformable material and an elongated dispensing duct having a liquid inlet which has a diameter smaller than the diameter of said duct.
2. The nozzle according to claim 1, characterized in that said duct has a constant diameter.
3. The nozzle according to claim 1, characterized in that said duct has a diameter which diverges toward an outlet or drop formation end.
4. The nozzle according to claim 3, characterized in that a terminal portion of the outlet end of said duct has a constant diameter.
5. The nozzle according to claim 3, characterized in that a terminal portion of the outlet end of said duct has a diameter which diverges toward the outlet end.
6. The nozzle according to claim 5, characterized in that said portion diverges more than said duct.
7. The nozzle according to claim 1, characterized in that the diameter of said inlet end is between 0.1 and 0.3 millimeters.
8. The nozzle according to claim 3, characterized in that said diverging diameter forms an angle between 0 and 30° in order to form drops of increasing size.
9. The nozzle according to claim 1, characterized in that said duct is axial.
10. The nozzle according to claim 1, characterized in that it is ogive-shaped.

55

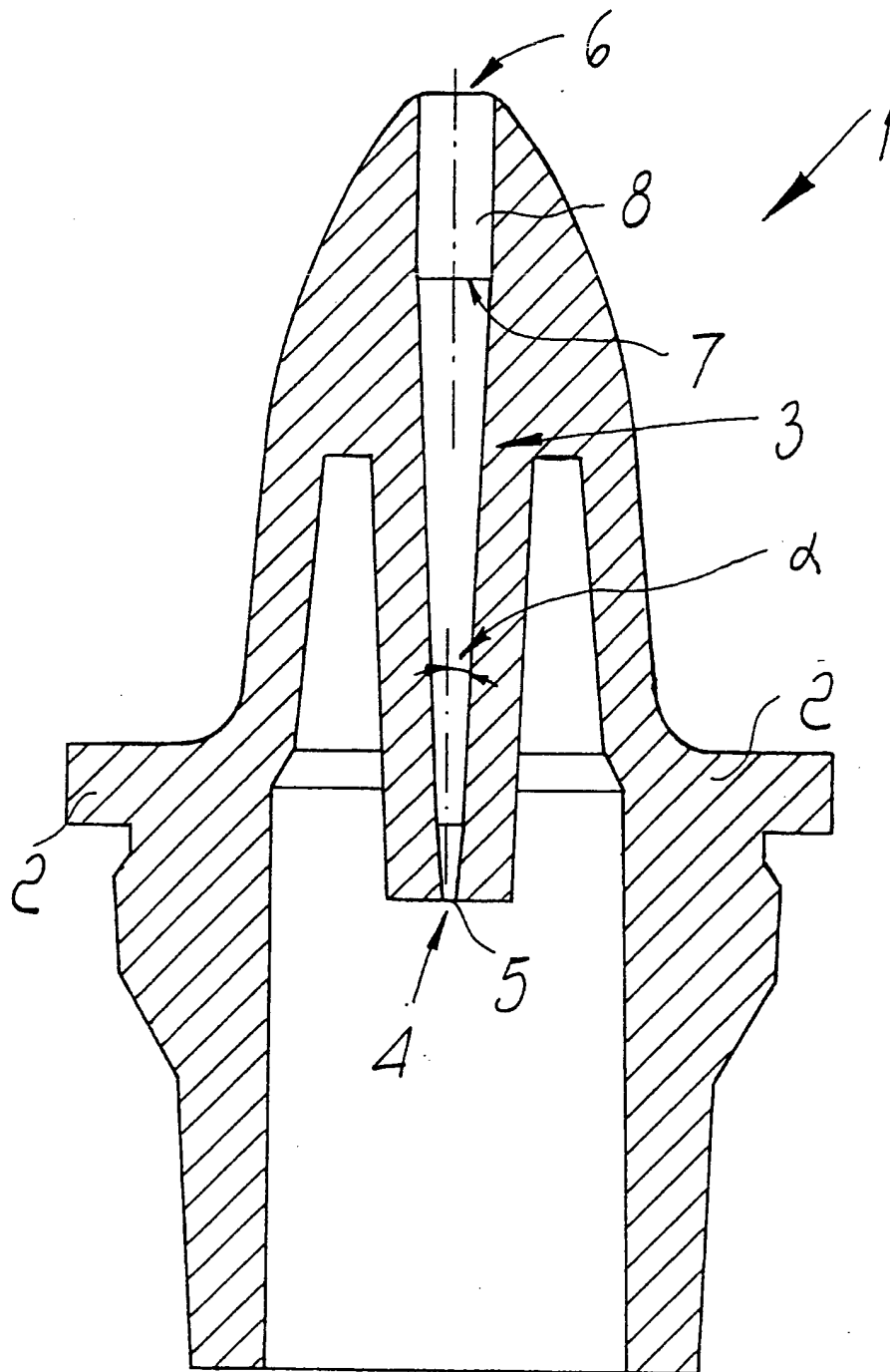


Fig. 1

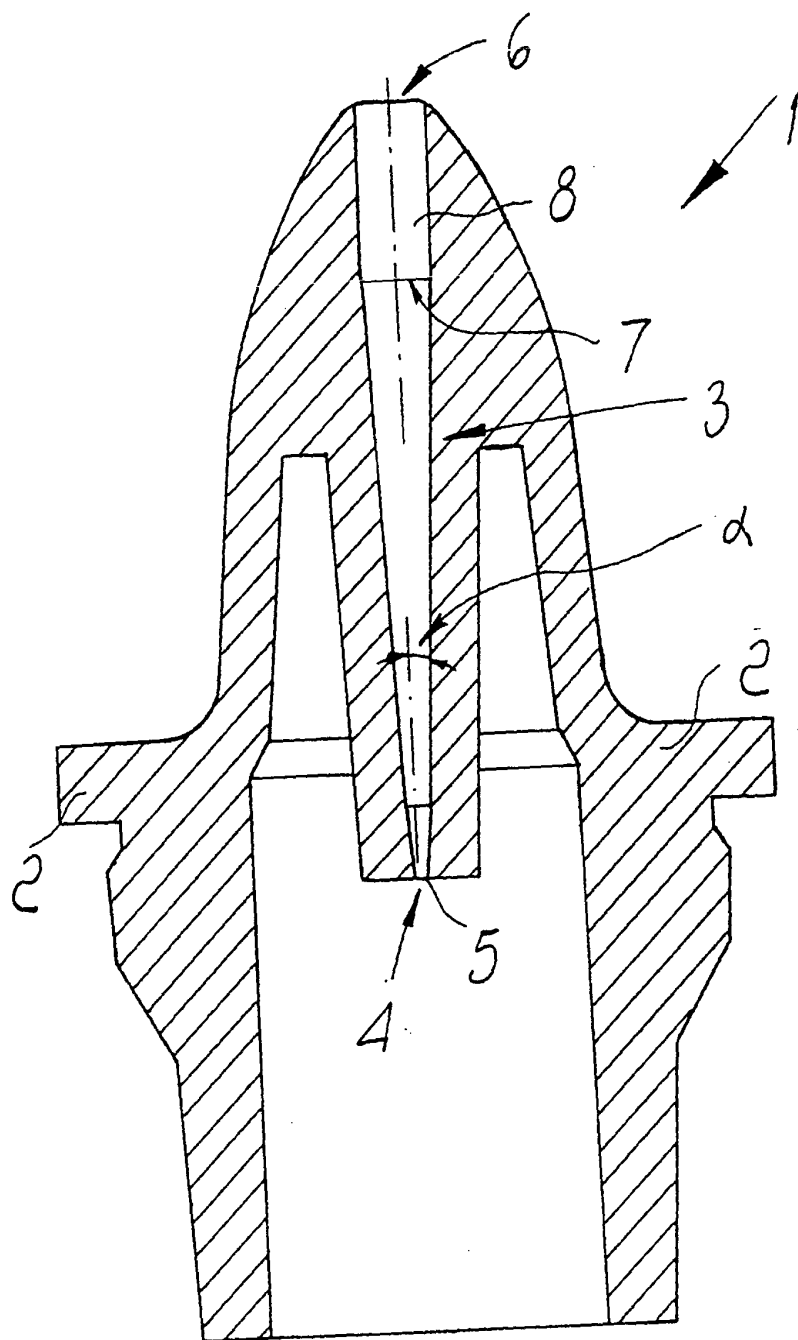
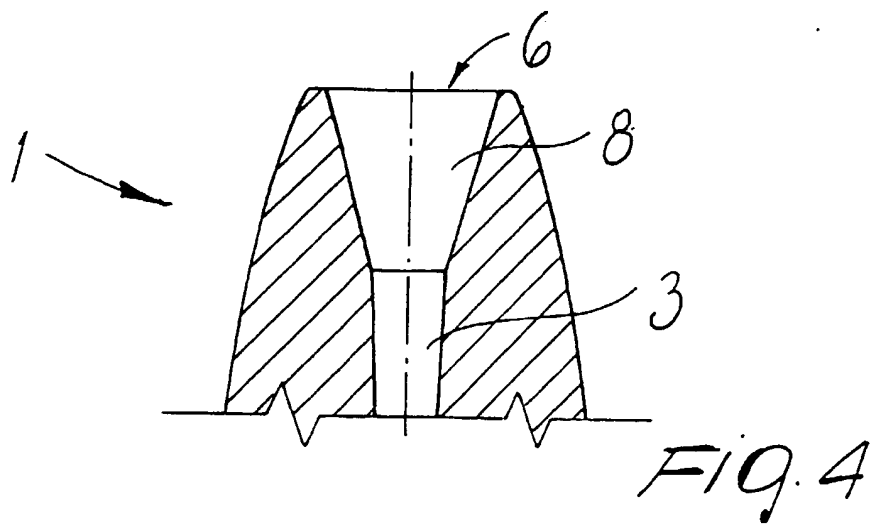
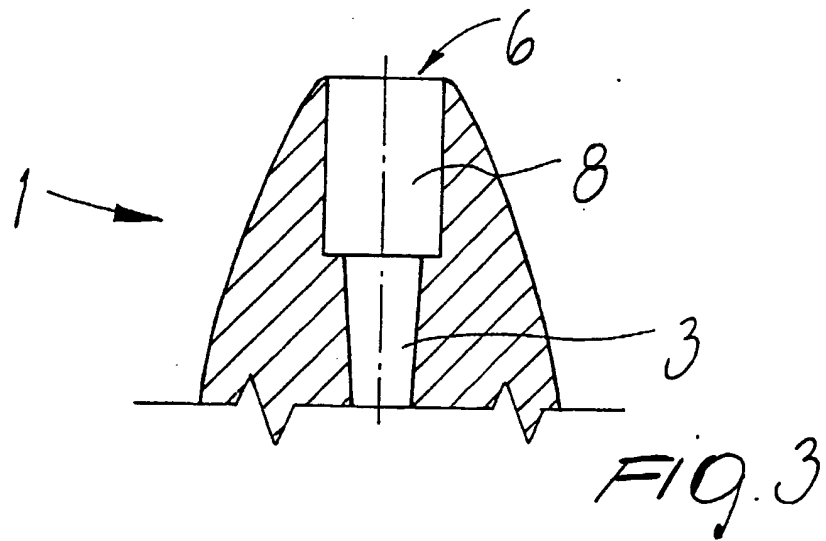
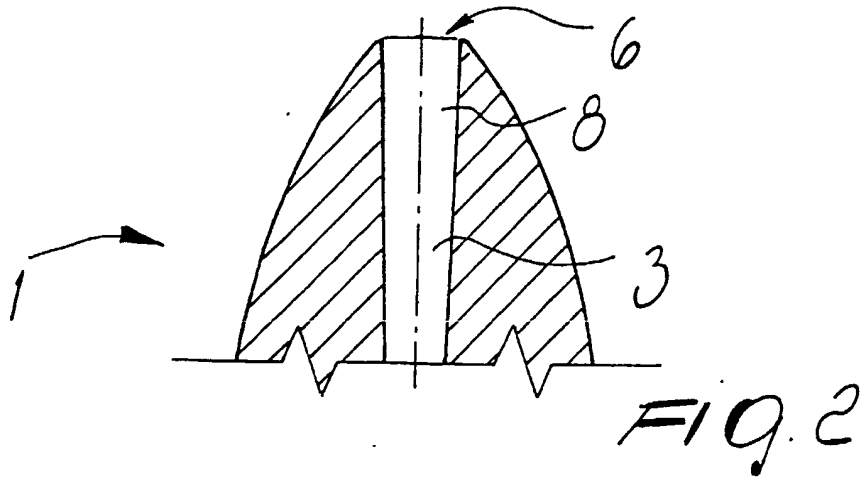
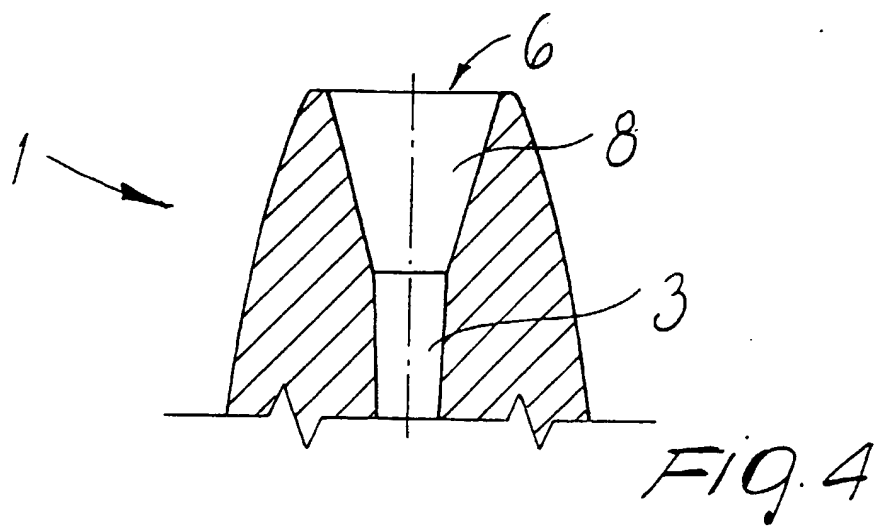
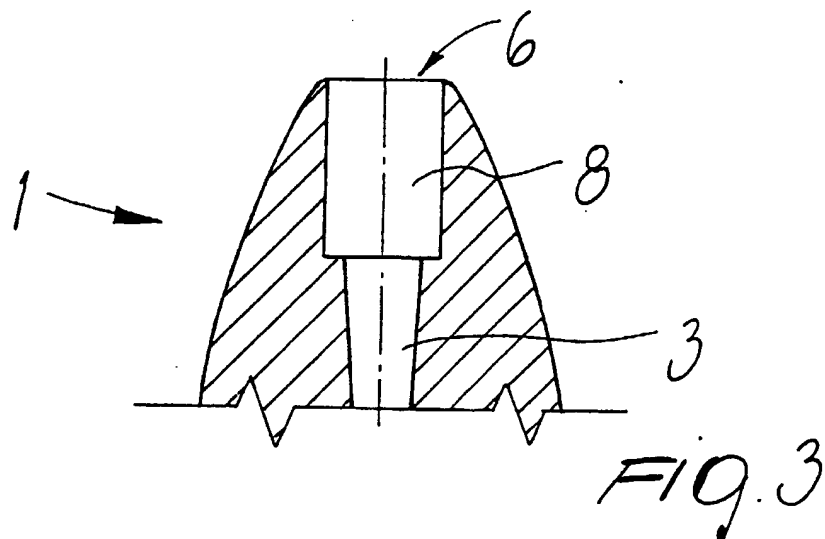
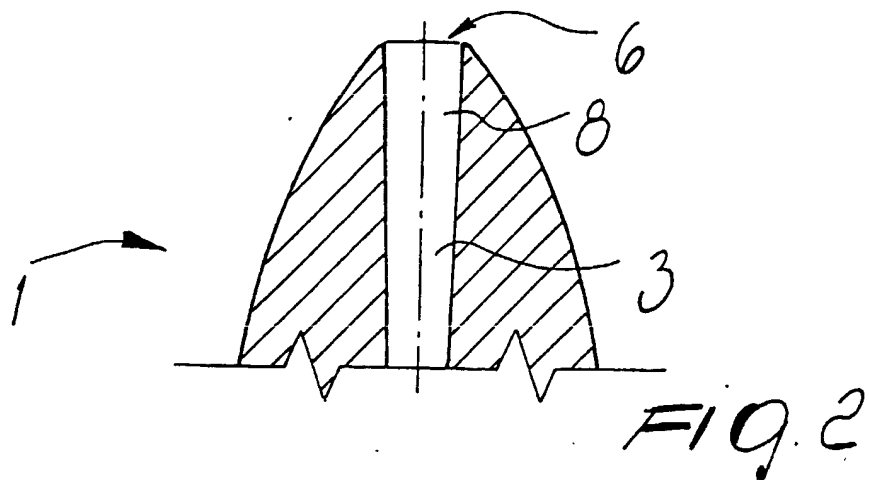


Fig. 1







European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 99 10 8628

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	EP 0 455 916 A (NALGE CO INC) 13 November 1991 (1991-11-13) * column 9, line 49 - column 10, line 49; figure 21 *	1,3,5-9	B05B1/02 B05B11/04 B65D47/18
X	US 5 431 314 A (BONNELYE, JEAN ET AL) 11 July 1995 (1995-07-11) * column 2, line 28 - column 3, line 52; figures 1,12 *	1,3,5,6, 8-10	
X	EP 0 431 885 A (MERCK SHARP & DOHME) 12 June 1991 (1991-06-12) * page 3, line 46 - page 7, line 19; figures *	1,3,4, 8-10	
X	US 5 358 151 A (STRASENBURGH, JAMES A.) 25 October 1994 (1994-10-25) * column 2, line 45 - column 3, line 30; figure 3 *	1,2,7,9	
X	US 2 987 223 A (ARMOUR, DONALD F.) 6 June 1961 (1961-06-06) * column 1, line 42 - column 2, line 51; figures 3,4 *	1,2,7,9	TECHNICAL FIELDS SEARCHED (Int.Cl.6) B05B B65D
X	FR 2 581 975 A (RORY LTD) 21 November 1986 (1986-11-21) * page 3, line 27 - page 4, line 36; figures 3,5 *	1,2,9	
The present search report has been drawn up for all claims			
Place of search MUNICH		Date of completion of the search 13 August 1999	Examiner Innecken, A
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

EPO FORM 1503 03/82 (P04/001)



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 99 10 8628

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	EP 0 455 916 A (NALGE CO INC) 13 November 1991 (1991-11-13) * column 9, line 49 - column 10, line 49; figure 21 *	1,3,5-9	B05B1/02 B05B11/04 B65D47/18
X	US 5 431 314 A (BONNELYE, JEAN ET AL) 11 July 1995 (1995-07-11) * column 2, line 28 - column 3, line 52; figures 1,12 *	1,3,5,6, 8-10	
X	EP 0 431 885 A (MERCK SHARP & DOHME) 12 June 1991 (1991-06-12) * page 3, line 46 - page 7, line 19; figures *	1,3,4, 8-10	
X	US 5 358 151 A (STRASENBURGH, JAMES A.) 25 October 1994 (1994-10-25) * column 2, line 45 - column 3, line 30; figure 3 *	1,2,7,9	
X	US 2 987 223 A (ARMOUR, DONALD F.) 6 June 1961 (1961-06-06) * column 1, line 42 - column 2, line 51; figures 3,4 *	1,2,7,9	TECHNICAL FIELDS SEARCHED (Int.Cl.6) B05B B65D
X	FR 2 581 975 A (RORY LTD) 21 November 1986 (1986-11-21) * page 3, line 27 - page 4, line 36; figures 3,5 *	1,2,9	
The present search report has been drawn up for all claims			
Place of search MUNICH		Date of completion of the search 13 August 1999	Examiner Innecken, A
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

EPO FORM 1503 03/82 (Pst/Col)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 99 10 8628

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

13-08-1999

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0455916 A	13-11-1991	CA 2041675 A	04-11-1991
		DE 69025320 D	21-03-1996
		DE 69025320 T	22-08-1996
		JP 2051377 C	10-05-1996
		JP 5085556 A	06-04-1993
		JP 7090870 B	04-10-1995
		US 5328058 A	12-07-1994
		US 5246145 A	21-09-1993
US 5431314 A	11-07-1995	FR 2696997 A	22-04-1994
		AT 153956 T	15-06-1997
		DE 69311254 D	10-07-1997
		DE 69311254 T	04-12-1997
		EP 0594490 A	27-04-1994
		ES 2105174 T	16-10-1997
EP 0431885 A	12-06-1991	FR 2655623 A	14-06-1991
		CA 2031632 A	09-06-1991
		JP 3251249 A	08-11-1991
US 5358151 A	25-10-1994	AU 6910394 A	20-12-1994
		WO 9427881 A	08-12-1994
US 2987223 A	06-06-1961	NONE	
FR 2581975 A	21-11-1986	CH 664132 A	15-02-1988
		DE 8613263 U	17-07-1986
		IT 206738 Z	01-10-1987

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 99 10 8628

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

13-08-1999

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 0455916	A	13-11-1991	CA 2041675 A	04-11-1991
			DE 69025320 D	21-03-1996
			DE 69025320 T	22-08-1996
			JP 2051377 C	10-05-1996
			JP 5085556 A	06-04-1993
			JP 7090870 B	04-10-1995
			US 5328058 A	12-07-1994
			US 5246145 A	21-09-1993
US 5431314	A	11-07-1995	FR 2696997 A	22-04-1994
			AT 153956 T	15-06-1997
			DE 69311254 D	10-07-1997
			DE 69311254 T	04-12-1997
			EP 0594490 A	27-04-1994
			ES 2105174 T	16-10-1997
EP 0431885	A	12-06-1991	FR 2655623 A	14-06-1991
			CA 2031632 A	09-06-1991
			JP 3251249 A	08-11-1991
US 5358151	A	25-10-1994	AU 6910394 A	20-12-1994
			WO 9427881 A	08-12-1994
US 2987223	A	06-06-1961	NONE	
FR 2581975	A	21-11-1986	CH 664132 A	15-02-1988
			DE 8613263 U	17-07-1986
			IT 206738 Z	01-10-1987